

For further prosecution in US

We claim:

- 5    1.    A process for preparing methylamines by gas-phase reaction of methanol  
          and ammonia as starting materials at a pressure in the range from 15 to  
          30 bar in the presence of a heterogeneous catalyst, which comprises  
          vaporizing the starting materials in one or more heat exchangers,  
          superheating them to form a feed gas stream and subsequently feeding this  
 10           into a reactor, with the starting materials either being mixed in the feed  
          stream to one of the heat exchangers or at any other position on the heat  
          exchanger, and taking off a product gas stream comprising  
          monomethylamine, dimethylamine and trimethylamine and also reaction  
          by-products from the reactor, wherein the reactor inlet temperature of the  
 15           starting materials is controlled to a temperature in the range from 360°C to  
          370°C by passing part or all of the feed gas stream or product gas stream  
          through an adjustable valve in order to vary the pressure.
2.    A process as claimed in claim 1, wherein the valve can be adjusted  
 20           steplessly.
3.    A process as claimed in claim 1, wherein the valve is installed upstream or  
          downstream of the reactor.
- 25    4.    A process as claimed in claim 1, wherein the product gas stream is used for  
          vaporizing and superheating the starting materials, resulting in partial  
          condensation of the product gas stream.
5.    A process as claimed in claim 1, wherein a substream of the product gas  
 30           stream is used for vaporizing and superheating the starting materials.
6.    A process as claimed in claim 1, wherein the reaction by-products formed  
          in the reaction are separated off from the product gas stream and fed back  
          into the reactor.

7. A process as claimed in claim 6, wherein the ammonia and the reaction by-products fed back into the reactor are preheated before the methanol is added.
- 5 8. A process as claimed in claim 1, wherein steam is added to the product gas stream to preheat and superheat the starting materials.
9. A process as claimed claim 1, wherein the reactor is operated adiabatically.
- 10 10. A process as claimed in claim 1, wherein heat of reaction is removed by cooling the reactor.
11. A process as claimed in claim 1, wherein, when a plurality of heat exchangers is used for vaporization and superheating of the starting materials, a droplet precipitator for separating condensate from the product gas stream is installed downstream of each heat exchanger.
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12. A process as claimed in claim 1, wherein the pressure at the inlet of the valve is from 0 to 5 bar higher than at the outlet of the valve.
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13. A process as claimed in claim 1, wherein the starting materials are heated up electrically to start the reaction.
14. A process as claimed in claim 1, wherein vaporization and susperheating of the starting materials is carried out in countercurrent.
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15. A process as claimed in claim 1, wherein vaporization and superheating of the starting materials is carried out in cocurrent.
- 30 16. A process as claimed in claim 1, wherein, when a plurality of heat exchangers is used for vaporization and superheating of the starting materials, at least one heat exchanger operates in cocurrent and at least one heat exchanger operates in countercurrent.